Amendments to the Specification

Please replace the paragraph at page 1, line 24 to page 2, line 7 with the following amended paragraph:

When a hydrogen-oxygen fuel cell works, protons provided by oxidation of hydrogen gas ~~penetrates~~penetrate into a fuel electrode (anode) and ~~combines~~combine with water molecules therein to form H_3O^+, and the resultant H_3O^+ moves to an air electrode (cathode). In the cathode, oxygen supplied through flow channels obtains electrons provided by oxidation of hydrogen gas, and combines with protons in the electrolyte to provide water. These processes are repeated to obtain electric energy continuously. Although the theoretical electromotive force of the hydrogen-oxygen fuel cell is 1.2 V, the actual output voltage is approximately 0.6 to 0.8 V because of voltage drop due to polarization of the electrode, crossover of the reaction gas where the fuel gas leaks to the cathode through the electrolyte, contact resistance of the electrode and the collector, etc. Accordingly, to obtain the practical output voltage, it is necessary to stack dozens of cells through the separators and connect the stacked cells in series.

Please replace the paragraph at page 2, line 17 to page 3, line 2 with the following amended paragraph:

Most of the conventional separators have been produced by machining a graphite plate. Although the graphite separators are low in electric resistance and high in corrosion resistance, they are poor in mechanical strength and high in machining cost. Thus, it is difficult to utilize the conventional graphite separators as the separator for the on-vehicle fuel cells, which is required to be high in the mechanical strength and low in the machining cost. Recently proposed is a separator that is produced by mixing graphite powder with a resin, and by injection-molding and baking the resulting mixture, however, there is a problem that it is low in density to be poor in the air-tightness. Although the density can be increased by impregnating the separator with a resin and by burning the resultant again to carbonize it, this results in complicated manufacturing processes. In addition, thus-produced separator has the contact electric resistance several times higher than that of the conventional graphite separator, whereby the fuel cell using this separator inevitably ~~lowered with respect to~~lowers the output voltage.

Please replace the paragraph at page 4, lines 15 to 27 with the following amended paragraph:

In the first separator, the metal plate is made of aluminum or an aluminum alloy. The anodized aluminum layer is preferably composed of a dense anodized aluminum layer having a porosity of less than 5%. In this case, the dense anodized aluminum layer preferably has a thickness of 5 to 50 μm. It is also preferred that the anodized aluminum layer is composed of a dense anodized aluminum layer having a porosity of less than 5%, and a porous anodized aluminum layer having a porosity of 5% or more provided on the dense anodized aluminum layer. Aluminum composing the metal plate preferably has a purity of 99.5% or more. A corner portion formed between surfaces of the flow channel is preferably in the shape of a curved surface having a curvature radius of 0.5 mm or more. Further, a corner portion formed between a side surface of the flow channel and the contact face is preferably in the shape of a curved surface having a curvature radius of 0.3 mm or more.

Please replace the paragraph at page 4, line 28 to page 5, line 18 with the following amended paragraph:

In the second separator, the heat-resistant polymer layer is preferably water repellent, and preferably made of a polymer material selected from the group consisting of vinyl resins, polyvinyl chloride, polytetrafluoroethylene, polyvinylidene fluoride, aromatic polyamides, polyimides, polycarbonates, polybutylene terephthalate, polyethylene terephthalate, polyesters, polystyrene, copolymers of styrene and another monomer, polyethylene, polypropylene, polyurethanes, silicone resins, polysulfones, polyethersulfones, rayon, cupra, acetate resins, promix, vinylon, vinylidene resins, acrylic resins and derivatives thereof. The heat-resistant polymer layer preferably has a multi-layered structure comprising two or more layers. The metal plate in the second separator is preferably made of aluminum or an aluminum alloy, in this case, it is preferable that an anodized aluminum layer is provided on the flow channel[[,]] <u>and</u> the heat-resistant polymer layer ~~being~~<u>is further</u> disposed on the anodized aluminum layer. The anodized aluminum layer is preferably composed of a porous anodized aluminum layer having a porosity of 5% or more. It is also preferable that the anodized aluminum layer is composed of a dense anodized aluminum layer having a porosity of less than 5%, and a porous anodized aluminum layer having a porosity of 5% or more provided on the dense anodized aluminum layer.

Aluminum composing the metal plate preferably has a purity of 99.5% or more.

Please replace the paragraph at page 5, lines 19 to 23 with the following amended paragraph:

On the contact face of the bipolar current collector separator of the present invention is preferably disposed a conductive film. The conductive film is particularly preferably made of[[:]] a metal selected from the group consisting of Pt, Au, Pd, Ru, Rh, Ir, Ag, mixtures thereof and alloys composed thereof; carbon; or a conductive carbide.

Please replace the paragraph at page 7, lines 20 to 25 with the following amended paragraph:

FIG. 1 is a fragmentary schematic view showing an example of a fuel cell using a first separator of the present invention. The fuel cell of FIG. 1 is constituted by the respective stacking cells, 11, ~~with each other~~ through a first separator 51, each cell 11 being prepared by disposing a solid electrolyte 21 between an anode 31 and a cathode 41. Both ends of the stack are generally connected to an external circuit

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(not shown).

Please replace the paragraph at page 10, line 26 to page 11, line 6 with the following amended paragraph:

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The fuel cell generally works at approximately 80 to 120 C., and the first separator in the fuel cell may be deformed by thermal expansion at such a temperature. In particular, there is a case where the anodized aluminum layer is cracked or damaged by deformation of the separator at a portion to which a large stress is applied, thereby remarkably reduced with respect to the corrosion resistance. Thus, in the first separator of the present invention, a corner portion formed between surfaces of the flow channel 81, which is shown as R1 in FIG. 3, is preferably in <u>the</u> shape of a curved surface to relax the stress. The curvature radius of the curved surface is preferably 0.5 mm or more, more preferably 1.0 mm or more.

Please replace the paragraph at page 11, lines 7 to 16 with the following amended paragraph:

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To a boundary between the anodized aluminum layer and the conductive film is often intensively applied the stress. Further, the anodized aluminum layer and the conductive film

grow vertically to the metal plate, not laterally, so that the anodized aluminum layer is easily damaged at the boundary. Thus, in the first separator of the present invention, a corner portion formed between a side surface of the flow channel 81 and the contact face, which is shown as R2 in FIG. 4, is preferably in the shape of a curved surface. The curvature radius of the curved surface is preferably 0.3 mm or more, more preferably 0.5 mm or more. In the first separator having such a curved surface, the anodized aluminum layer is sufficiently prevented from swelling and straining.

Please replace the paragraph at page 11, line 25 to page 12, line 1 with the following amended paragraph:

FIG. 5 is a fragmentary schematic view showing an example of a fuel cell using the second separator of the present invention. The fuel cell of FIG. 5 is constituted by the respective stacking cells, 12, ~~with each other~~ through a second separator 52, each cell 12 being prepared by disposing a solid electrolyte 22 between an anode 32 and a cathode 42. Both ends of the stack are generally connected to an external circuit (not shown).

Please replace the paragraph at page 13, lines 16 to 22 with the following amended paragraph:

A method for disposing the heat-resistant polymer layer is not particularly limited. For example, the heat-resistant polymer layer may be disposed by[[:]] dissolving a polymer material in an appropriate organic solvent; and dipping a metal plate in the resultant solution, followed by drying. Further, the heat-resistant polymer layer may be disposed by[[:]] covering a metal plate with a thin polymer film; and heating the thin polymer film to fusion-bond it to the metal plate.